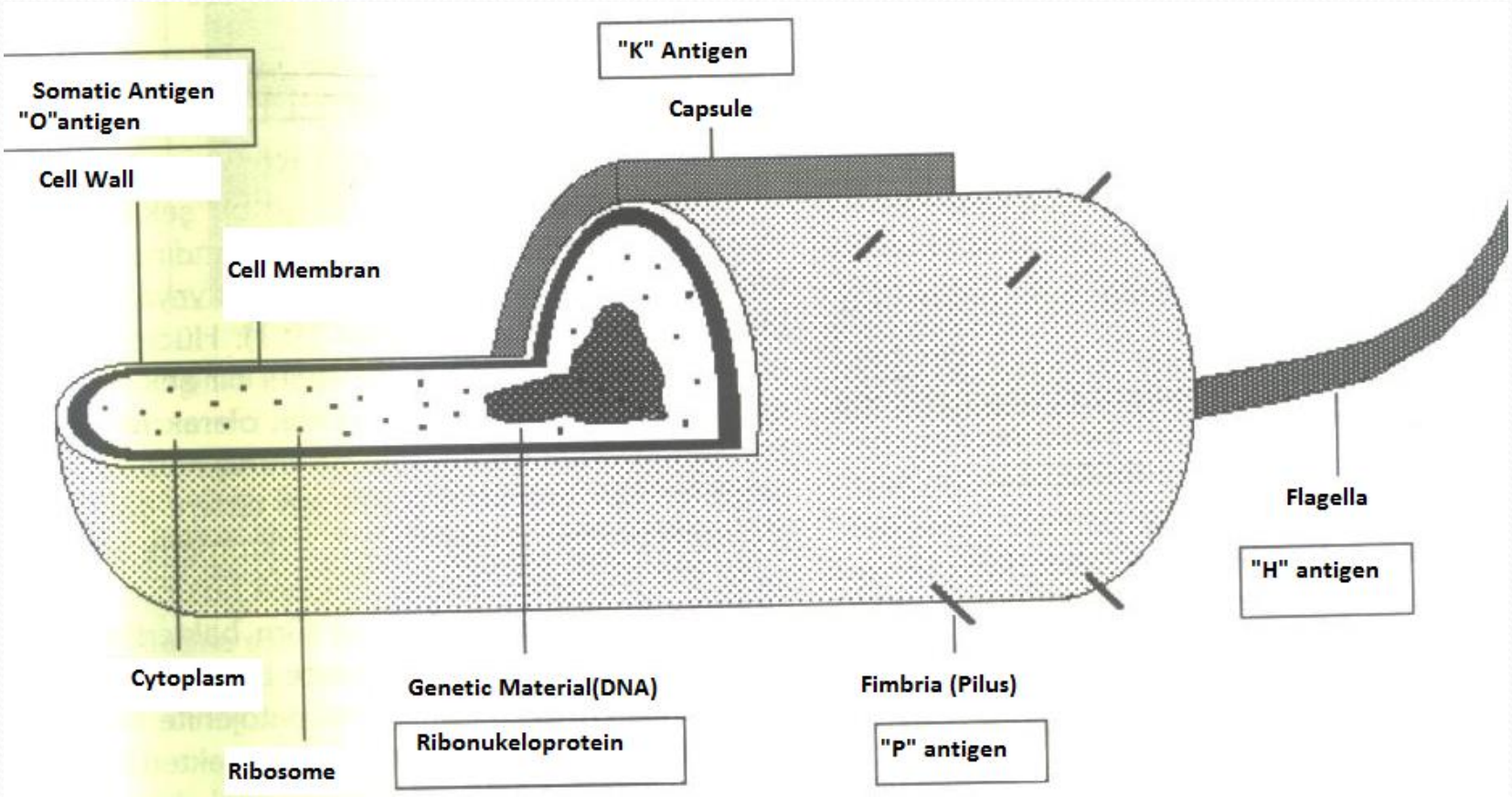
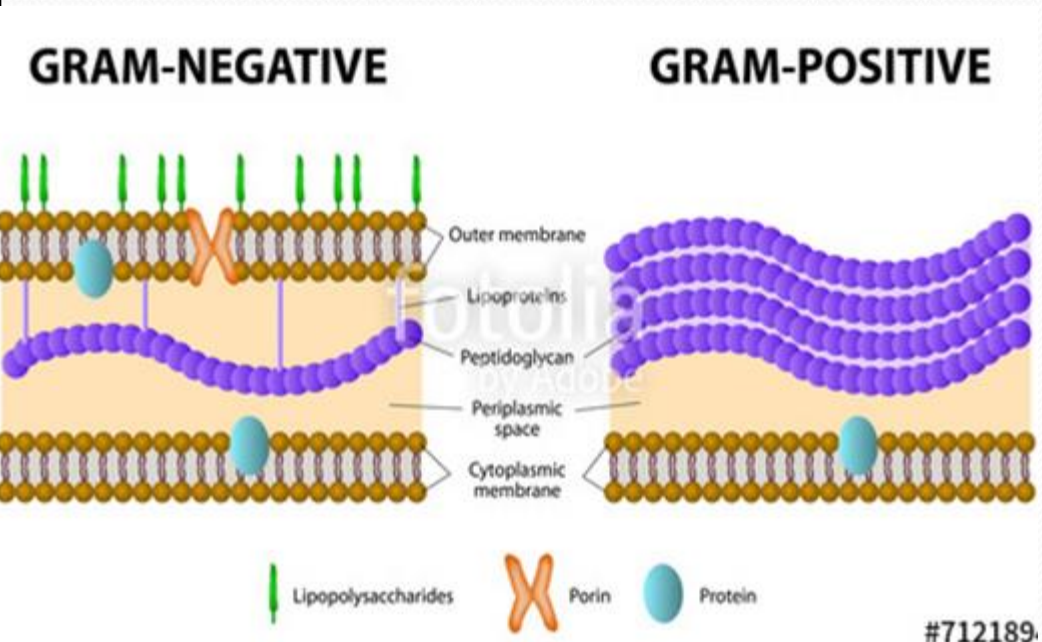
IMMUNITY TO BACTERIA

IMMUNITY TO BACTERIA

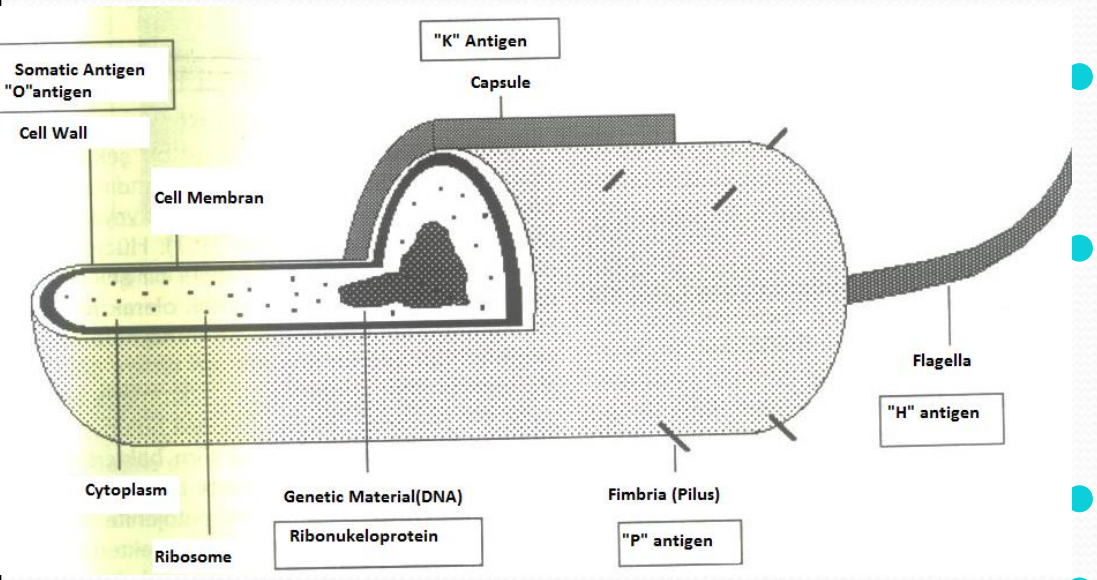


IMMUNITY TO BACTERIA



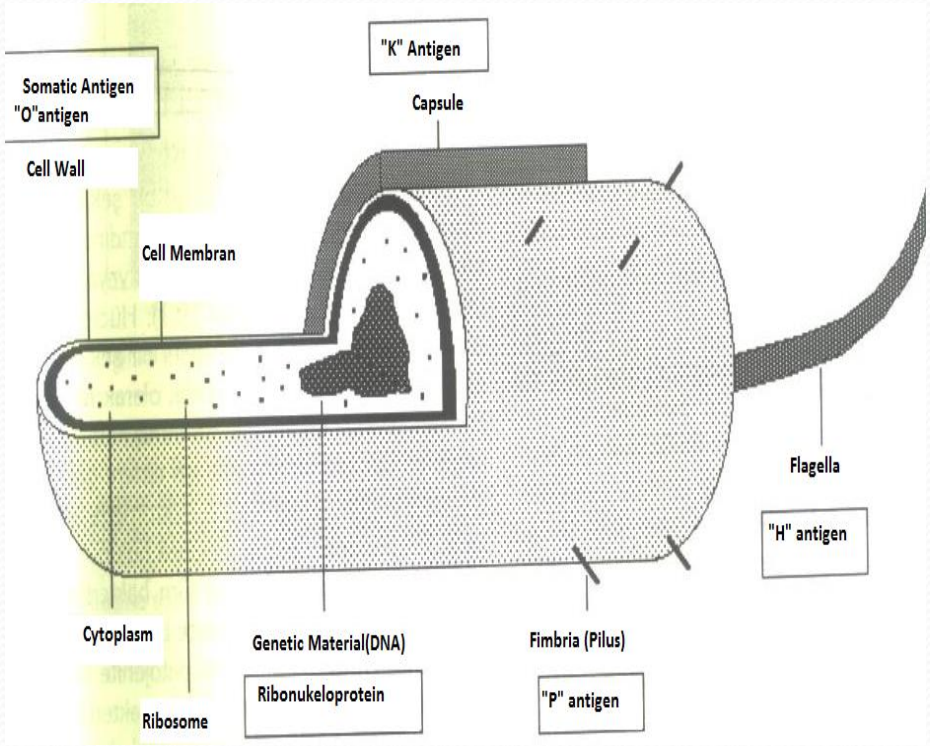
- Cell wall - Somatic antigen (O antigen):
- -Gr (+) peptidoglycan teicoic acid and lipoteicoic acid
- -Gr (-) lipopolysaccharide and porine proteins
- Morphological structure, substance exchange, antigenic structure, adhesive molecule content, protection from environmental and host defense factors
- Antibodies to cell wall antigens; Opsonization, agglutination, neutralization

IMMUNITY TO BACTERIA



- Capsule (K antigen):
- -polysaccharide (B.anthracis protein)
- - protection from environmental factors and host immune system
- -antifagocytic property
- -Anti-capsular immune response; the opsonization

IMMUNITY TO BACTERIA



Flagella (H antigen)

-flagellin (protein)

- movement organelle

-anti-flagellar immune response; agglutination

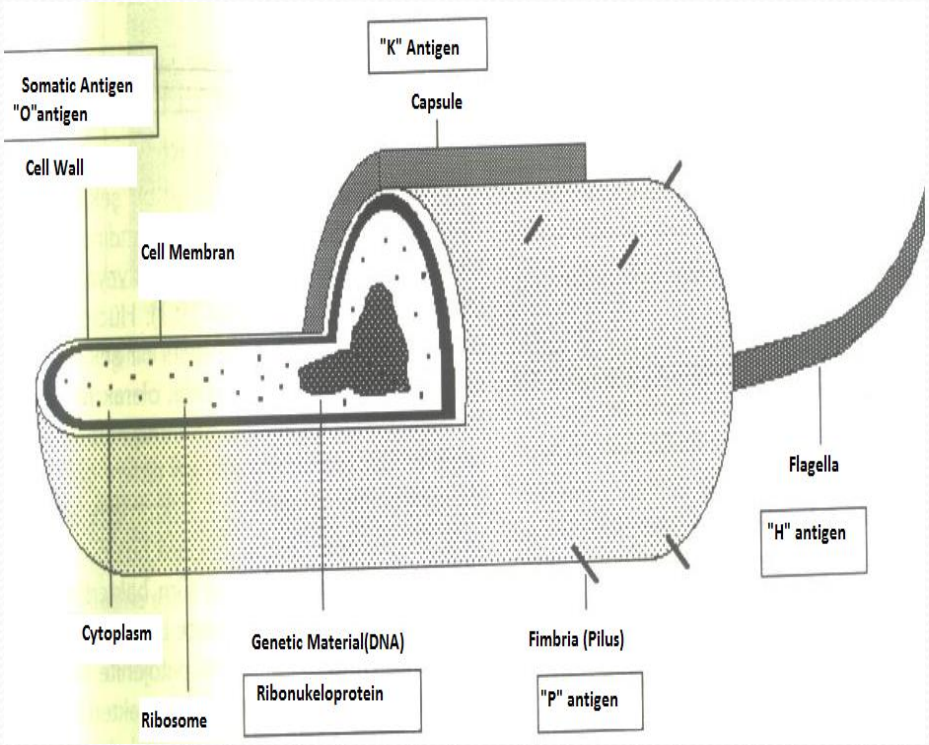
Fimbria-Pilus (P antigen)

-piline (protein)

-adhesion organelle

-anti-fimbrial immune response; neutralization

IMMUNITY TO BACTERIA



exotoxins;

-protein

- lysis of tissue cells (neurotoxin, leukotoxin, hepatotoxin)

-antitoxin immune response; neutralization

Internal structures; intrastoplasmic organelles

Heat shock proteins (stress proteins)

Pathogenesis of bacterial infections

Exotoxigenic mechanism;

Exotoxins break cells, disrupt cell functions, stimulate excessive amounts of harmful cytokines.

Endotoxogenic mechanism;

- initiates cytokine synthesis by stimulating inflammation cells (neutrophils, macrophages, endothelial cells), causing inflammation-shock-depression-fever

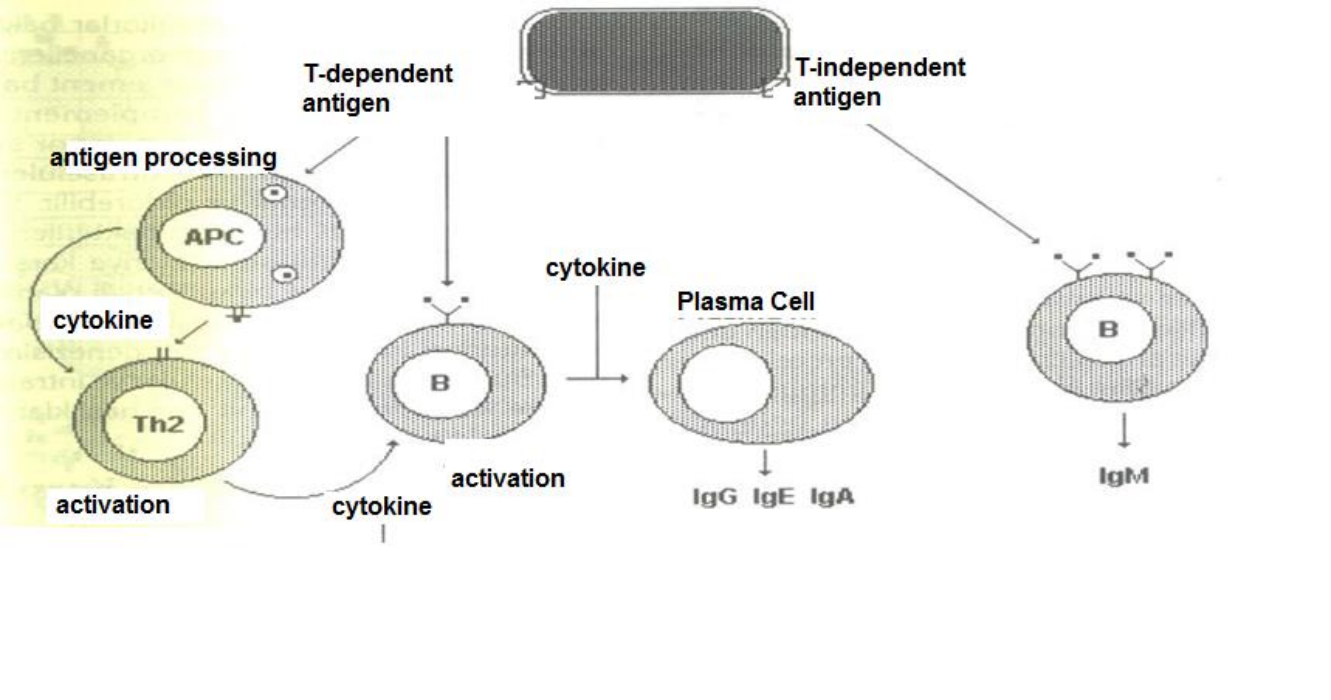
Invasive mechanism;

- They emit strong enzymes (hyaluronidase, collagenase, coagulase, etc.) that spread in tissues and disrupt the structure and function of tissues or live in cells (intracellular bacteria).

NATURAL DEFENSE MECHANISMS

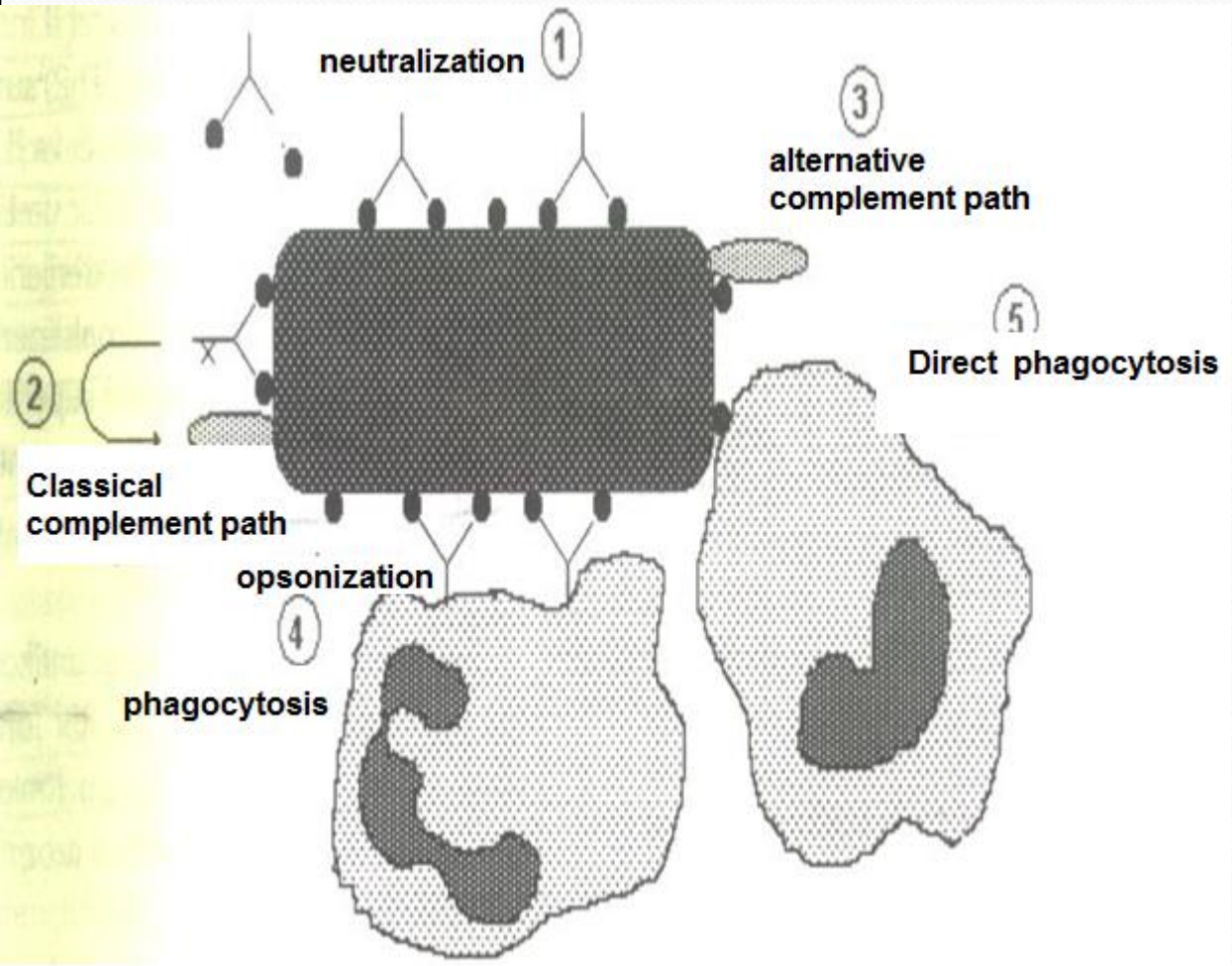
- Genetic factors
- Hormones (low-dose steroid and estrogen: immunostimulatory effect - high-dose steroid, testesterone and progesterone: immunosuppressive effect)
- Nutrition
- lysozyme
- Free fatty acids (oleic acid)
- Antibacterial peptides (beta lysine, defensin, spermine)
- Iron binding proteins (lactoferrin, transferrin, ferritin)

Immune Response to Extracellular Bacteria



- Humoral immune response is effective.
- It is part of the bacterial cell wall and the capsule-polysaccharide-structured antigen and a T-independent immune response occurs.
- Bacterial cell wall (peptidoglycan, porine, glycoprotein, etc.), flagella and fimbria - protein-antigen and T-dependent immune response occurs.

Functions of Antibodies to Extracellular Bacteria



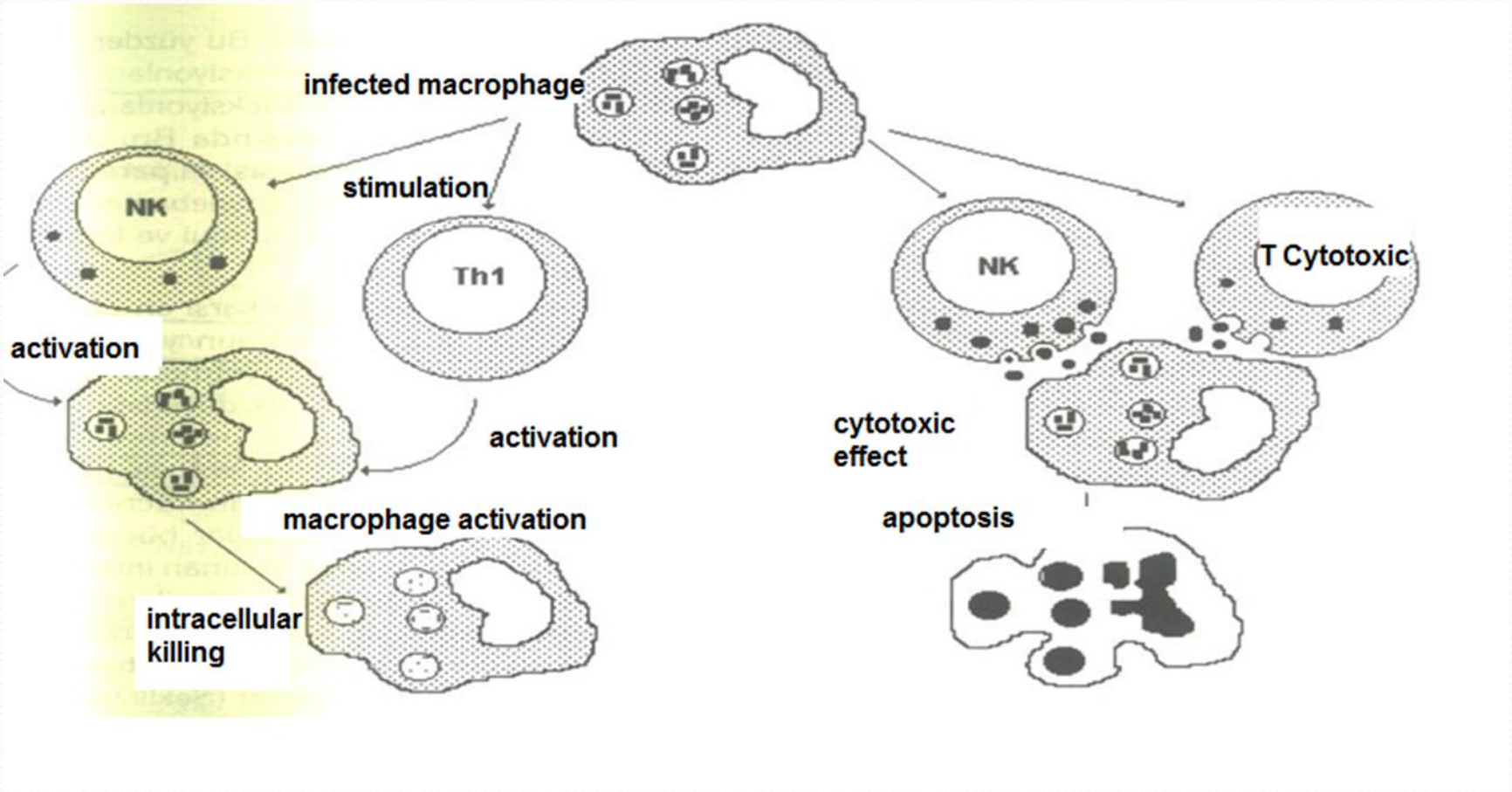
- Complement activation (IgG and IgM)
- Opsonization (IgG and IgM)
- Neutralization (IgA, IgG and IgM)
- Inflammation Stimulation

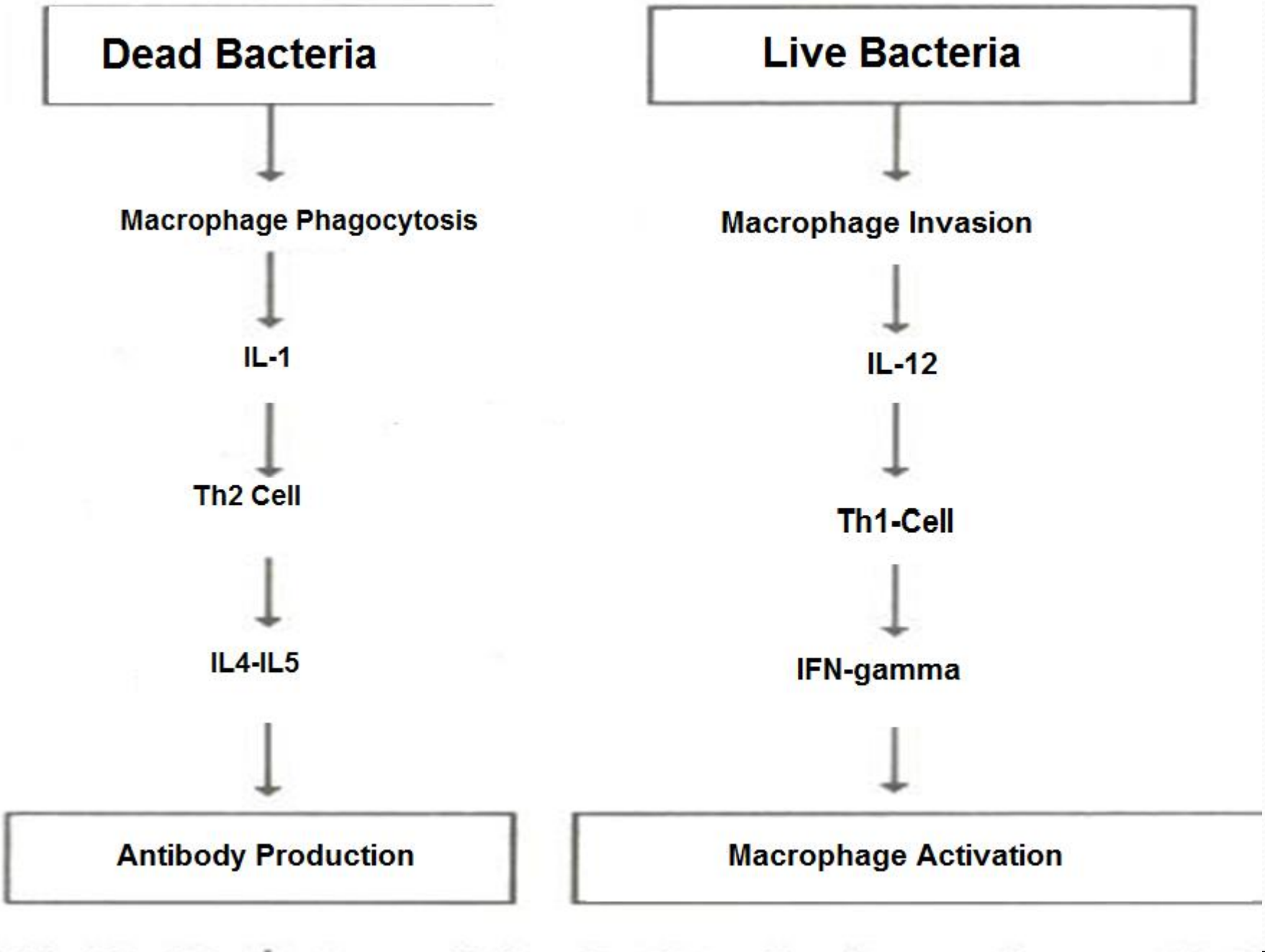
Immune Response to Intracellular Bacteria

- These bacteria are more resistant than others,
- They can survive for a long time in the cells to which they are phagocytized,
- They cause chronic infections,
- Cellular immunity is effective,
- Three basic mechanisms are effective in cellular immunity

Immune Response to Intracellular Bacteria

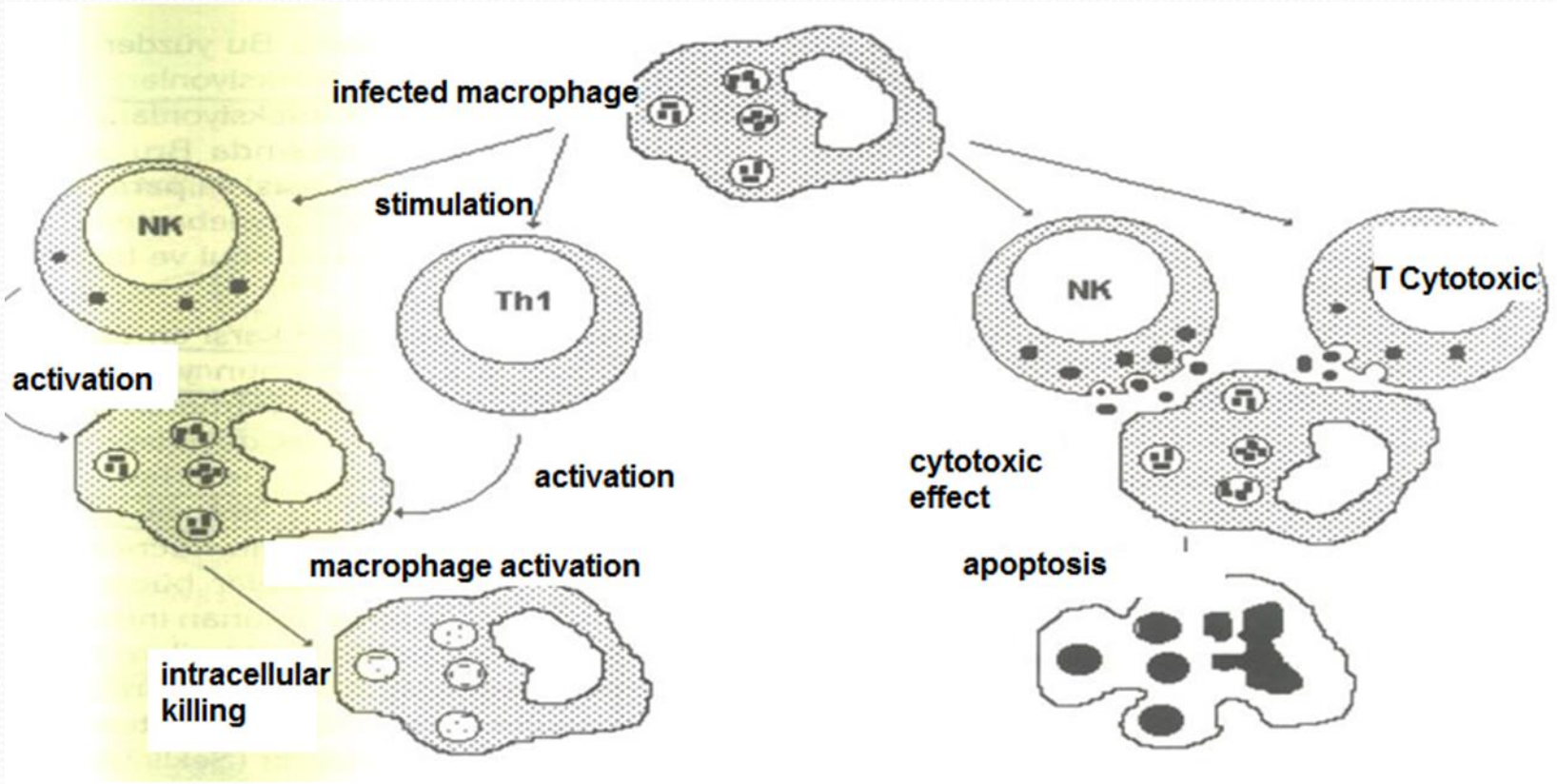
- ***Macrophage activation:*** ***IL12 (infected macrophage) and IFN gamma (NK cell) → Th1 stimulation → IL2 and IFN gamma (Th1) → macrophage activation***




Dead Bacteria
Live Bacteria
Macrophage Phagocytosis
Macrophage Invasion
IL-1
IL-12
Th2 Cell
Th1-Cell
IL4-IL5
IFN-gamma
Antibody Production
Macrophage Activation

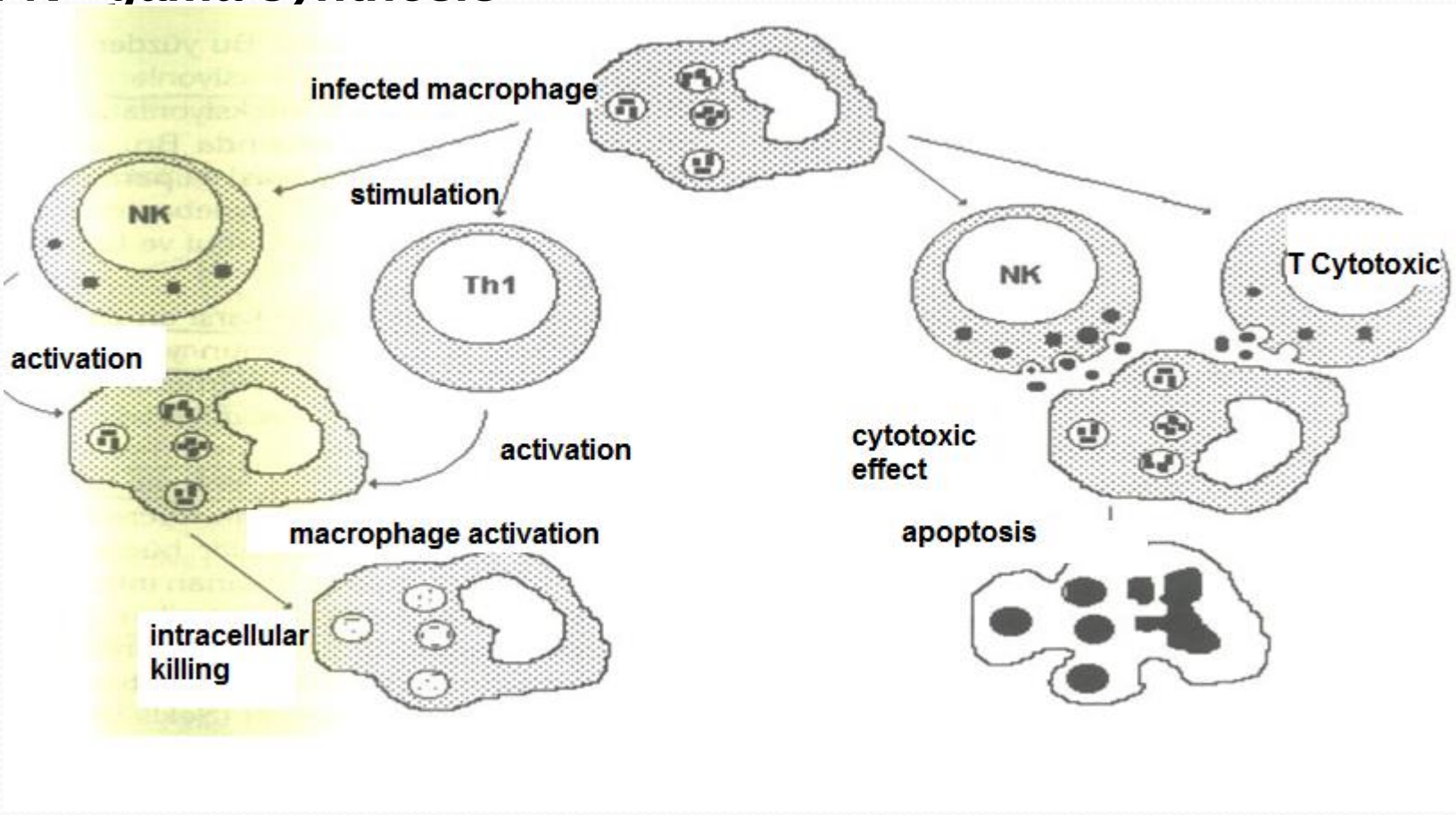
Immune Response to Intracellular Bacteria

- ***Cytotoxic T-lymphocyte:*** ***Intrastoplasmic protein antigens → presentation with MHC class I → cytotoxic T-lymphocyte stimulation → apoptosis***



Immune Response to Intracellular Bacteria

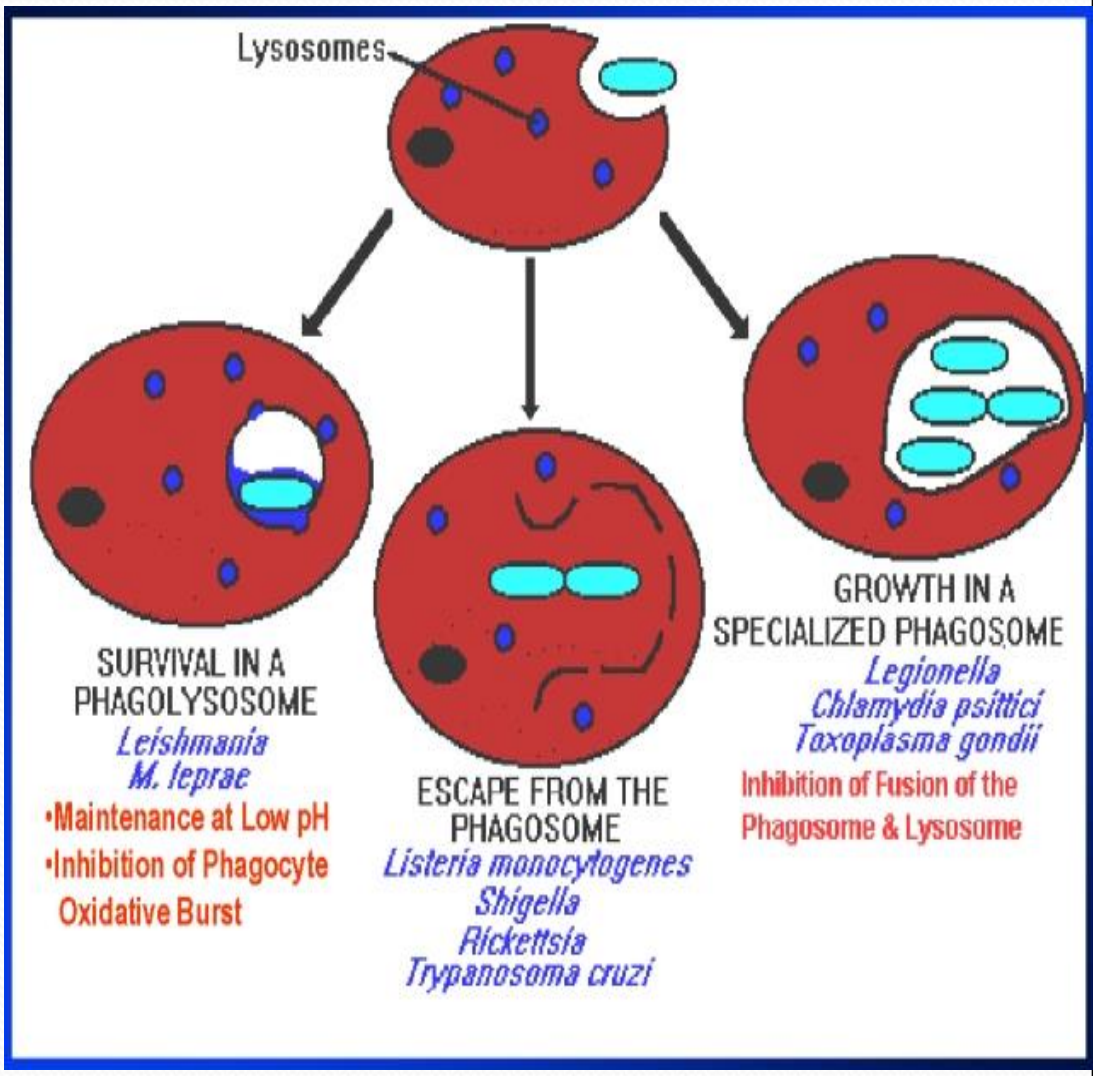
- ***NK cells:*** ***IL12 (infected macrophage) → NK cell stimulation → macrophage activation by apoptosis and IFN –gama synthesis***



Ways of Bacteria to Avoid Immune Response

Resistance to phagocytosis

- Resistance to ingestion (capsule)
- Live on the phagolysosome stay
- Survival of cell stoplasm by escape from phagosome
- Phagolysosome formation blocking and phagosome development



Ways of Bacteria to Avoid Immune Response

- Resistance to complement effect

(capsule structure)

- Destruction of immune system molecules

(IgA and IL-2 degrading enzymes)

- Antigenic variation